



# **Guidance for Clean Closure of Dangerous Waste Facilities**

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Prepared by  
Washington State Department of Ecology  
Hazardous Waste and Toxics Reduction Program

August 1994  
Publication #94-111  
Revised 6/01

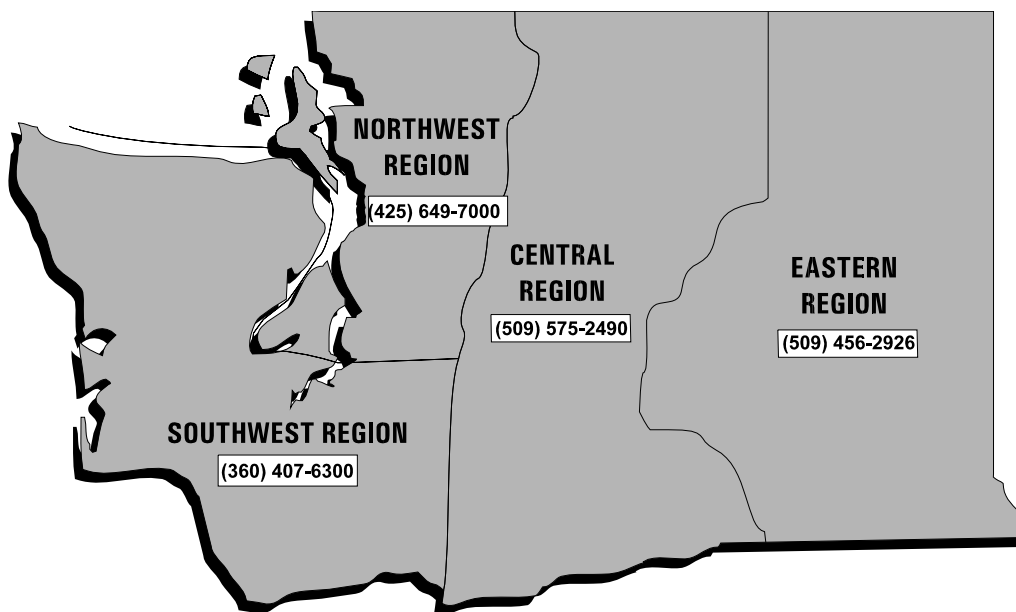
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## TABLE OF CONTENTS

	<u>Page</u>
<b>1.0 INTRODUCTION</b> .....	1
1.1 Authority.....	1
1.2 Disclaimer.....	1
1.3 Partial and Final Closure.....	1
1.4 Additional Requirements.....	2
1.5 Additional Information.....	2
<b>2.0 CLOSURE PLANS</b> .....	3
2.1 Contents of the Closure Plan.....	3
2.2 Closure Plan Review and Approval.....	4
2.3 Public Participation.....	5
2.4 Amending Closure Plans.....	5
2.5 Activities Conducted Prior to Closure Plan Approval.....	6
<b>3.0 CLOSURE PERFORMANCE STANDARD</b> .....	7
3.1 Clean Closure Levels.....	7
3.2 MTCA Method A.....	8
3.2.1 Definition of Routine.....	8
3.2.2 Clean Closure Levels - MTCA Method A.....	9
3.2.3 Misuse of the MTCA Method A Tables.....	9
3.3 MTCA Method B.....	9
3.4 Adjusting Constituent Concentrations to Meet the Cleanup Standards.....	10
3.5 Natural Background.....	10
3.6 Indicator Constituents.....	10
3.7 Pre-Existing Contamination.....	10
3.8 Post-Closure Care.....	11
<b>4.0 REMOVAL</b> .....	13
4.1 Waste Minimization.....	13
4.2 Contaminated Environmental Media.....	14
4.2.1 Contained-In Policy for Media.....	14
4.3 Hazardous Debris.....	15
4.2.1 Contained-In Policy for Hazardous Debris.....	15
4.4 The Empty Container Rule.....	16

	<u>Page</u>
<b>5.0 DECONTAMINATION .....</b>	<b>17</b>
5.1 Unit Inspection Prior to Decontamination .....	17
5.2 Decontamination Standards .....	18
5.3 Compliance with Decontamination Standards.....	18
5.4 Decontamination and Compliance with the LDR.....	19
5.5 Other Decon. Methods & Equivalent Technology Demonstrations .....	19
5.6 Sampling .....	20
5.7 Decontamination Residuals .....	20
5.8 Decontamination of Concrete Containment Structures .....	21
5.8.1 Contained-In Policy .....	21
5.9 Decontamination of Metal Tanks and Tank Systems .....	22
<b>6.0 SAMPLING AND ANALYSIS FOR CLEAN CLOSURE .....</b>	<b>27</b>
6.1 Sampling and Analysis Plan .....	27
6.2 Designing a Sampling Program .....	28
6.2.1 Area-Wide Sampling .....	28
6.2.2 Focused Sampling.....	29
6.2.3 Sampling for Hot Spots.....	29
6.3 Sampling to Determine or Confirm Clean Closure.....	30
6.4 Statistical Guidelines .....	30
6.5 Soil Sampling During Closure .....	30
6.5.1 Soil Sampling Under Structures .....	30
6.5.2 Soil Sampling at Various Structures .....	31
6.6 Groundwater Monitoring During Closure .....	31
6.7 Selection of Constituents to be Analyzed .....	32
6.8 Approved Analytical Methods.....	33
6.9 Multiple Analytical Methods .....	33
6.10 Quality Assurance and Quality Control Requirements.....	34
6.10.1 Field Quality Assurance/Quality Control .....	34
6.10.2 Laboratory Quality Assurance/Quality Control.....	34
6.11 Data Quality Objectives .....	35
6.12 Practical Quantitation Limits .....	35
<b>7.0 CLOSURE TIME LINE.....</b>	<b>37</b>
7.1 Compliance with Decontamination Standards.....	37
7.2 Unit Inspection Prior to.....	38
7.3 Decontamination Standards .....	38
7.3.1 Compliance with Decontamination Standards.....	39
7.3.2 Unit Inspection Prior to Decontamination .....	39
7.4 Compliance with Decontamination Standards.....	40
7.5 Compliance with Decontamination Standards.....	41
<b>8.0 REFERENCES.....</b>	<b>43</b>

## **1.0 INTRODUCTION**

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The purpose of this document is to provide guidance for closure of dangerous waste management units at interim and final status treatment, storage, and disposal facilities (TSDF). This document provides specific direction for demonstrating compliance with the clean closure performance standard through removal and decontamination of dangerous wastes (DW), DW constituents, and waste residue.

### **1.1 Authority**

Owners and operators of dangerous waste treatment, storage, or disposal facilities must comply with the Federal Resource Conservation and Recovery Act (RCRA) and its implementing regulations in Chapter 40 of the Code of Federal Regulations (CFR). The U.S. Environmental Protection Agency (EPA) has delegated the responsibility to administer major portions of the RCRA program, including closure requirements, to the Washington State Department of Ecology (Ecology). Ecology has adopted associated state regulatory language in Chapter 173-303 of the Washington Administrative Code (WAC) entitled, “Dangerous Waste Regulations.” Specific requirements for closure of final status dangerous waste management units and facilities are found in WAC 173-303-610 through WAC 173-303-680; requirements for closure of interim status units and facilities are found in WAC 173-303-400.

### **1.2 Disclaimer**

Conformance with this guidance does not release facility owner/operators from their obligations to notify Ecology prior to beginning the closure process, to submit closure plans for Ecology review and approval, or to in any other way comply with the requirements of Chapter 173-303 WAC. This guidance does not constitute agency rulemaking and cannot be relied on by any person to create a right or benefit enforceable at law or equity. Ecology reserves the right to act at variance with this guidance at any time.

The methods described in this document do not represent the only methods acceptable to Ecology for demonstration of clean closure. Alternative methods to those presented here may be used, subject to site specific consideration during the closure plan approval process.

### **1.3 Partial and Final Closure**

Partial closure means the closure of a dangerous waste management unit in accordance with the applicable requirements of WAC 173-303-400 and 173-303-610 through WAC 173-303-680 at a facility that has other active dangerous waste management units. For example, partial closure may include the closure of a tank system, landfill cell, surface impoundment, waste pile, or other dangerous waste management unit, while other dangerous waste management units at the same facility continue to operate. Final closure means the closure of all dangerous waste management units at a facility in accordance with the closure requirements so that dangerous waste management activities regulated under WAC 173-303-400 and/or WAC 173-303-610 through WAC 173-303-680 are no longer conducted at the facility.

## **1.4 Additional Requirements**

This guidance does not address requirements which are applicable during the active life of a dangerous waste management unit/facility including, but not limited to, requirements for financial assurance, closure cost-estimates, groundwater monitoring, inspection and recordkeeping. An order form for other Ecology guidance documents is provided at the end of this document.

## **1.5 Additional Information**

Ecology encourages facility owner/operators to work closely with the department when developing closure plans and conducting closure activities. For more information on the application of specific closure requirements to your dangerous waste management facility, you may contact the appropriate regional office of the Department of Ecology as listed in the map at the beginning of this document and ask to speak with a hazardous waste specialist.



## **2.0 CLOSURE PLANS**

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The owner/operator of a dangerous waste management facility must have a written closure plan. The written closure plan must address closure of each dangerous waste management unit and final closure of the facility. At final status facilities, the closure plan must be provided to Ecology with the RCRA Part B permit application for the facility. Ecology will typically review the closure plan as part of the permit review process. If a final permit is issued, the closure plan will be a condition of the final permit.

At facilities operating under interim status, the closure plan must be maintained at the facility and provided to Ecology during site inspections and/or in response to written requests. Ecology does not typically review and approve interim status closure plans until the facility owner/operator notifies Ecology that they intend to begin closure activities.

### **2.1 Contents of the Closure Plan**

The closure plan must include, but is not limited to:

(1) The closure performance standard (see section 3):

- ▶ A detailed description of how each dangerous waste management unit at the facility will be closed in accordance with the closure performance standard, including detailed descriptions of all activities planned during the closure period; and
- ▶ A description of how final closure of the facility will be conducted in accordance with the closure performance standard. This description must identify the maximum number and capacity of dangerous waste management units which will be in use (un-closed) during the active life of the facility.

(2) Procedures for Removal of Wastes (see section 4):

- ▶ An estimate of the maximum inventory of dangerous wastes on-site during the active life of the facility;
- ▶ A detailed description of the methods planned to remove wastes and/or contaminated equipment, bases, liners, soils/subsoils during partial closure(s) and final closure. The description should include, but not be limited to, methods for removing, transporting, treating, storing, or disposing of all dangerous wastes and waste residues (including hazardous debris and contaminated environmental media); and
- ▶ Identification of the type(s) of on- and off-site dangerous waste management units to be used, if applicable.

(3) Decontamination Procedures (see section 5):

- ▶ A detailed description of the steps needed to remove or decontaminate all dangerous waste residues and contaminated containment system components, equipment, structures, soils, and subsoils during partial and final closure, including, but not limited to, procedures for cleaning and decontaminating equipment and removing contaminated soils/subsoils;
- ▶ Methods for sampling and testing surrounding soils/subsoils, and criteria for determining the extent of decontamination required to satisfy the closure performance standard;
- ▶ Procedures for inspecting all units prior to decontamination, recording releases and potential releases, and reporting such releases and potential releases to Ecology;
- ▶ Detailed descriptions of implementation of planned decontamination methods; and
- ▶ Detailed description of methods which will be used to collect and manage decontamination residuals (e.g., rinse water).

(4) Procedures for Sampling and Analysis (see section 6):

- ▶ A sampling and analysis plan prepared in accordance with section 6.1 of this guidance, including, sampling approach, methods, and procedures and rationale for each selection; and
- ▶ Detailed descriptions of field and lab quality assurance/quality control (QA/QC) procedures.

(5) Discussion of the closure time line (see section 7):

- ▶ A schedule for closure of each dangerous waste management unit and for final closure of the facility.

## **2.2 Closure Plan Review and Approval**

Ecology is responsible for ensuring that approved closure plans are consistent with the closure performance standard and other applicable requirements of the dangerous waste regulations. Ecology is also responsible for ensuring meaningful opportunities for public review of closure activities.

For final status facilities, Ecology typically reviews and approves closure plans as part of the dangerous waste permitting process. Public review of final status facility closure plans typically occurs as part of the public review associated with issuance of dangerous waste permits.

At facilities operating under interim status, Ecology typically reviews closure plans when the facility owner/operator notifies Ecology that they expect to begin partial or final closure activities. After receipt of a notification of intent to begin partial or final closure and a written

interim status closure plan, Ecology will review the plan and either tentatively approve or disapprove the plan within ninety (90) days. If Ecology tentatively approves the closure plan, the tentative approval will be included in the public notice procedures discussed below. If Ecology disapproves the closure plan, the facility owner/operator will be provided with detailed written comments summarizing the reasons for the disapproval.

If Ecology disapproves the initial closure plan, the facility owner/operator has thirty (30) days from receipt of Ecology's disapproval and comments to modify the closure plan and submit a revised closure plan for Ecology review and approval. Ecology will then either tentatively approve or modify the revised closure plan within sixty (60) days of receipt. If Ecology tentatively approves the closure plan, the tentative approval will be included in the public notice procedures discussed below. If Ecology modifies the plan, the modified plan becomes the tentatively approved closure plan (also subject to the public participation period discussed below) and Ecology will send a copy of the modified and tentatively approved plan with a detailed statement of the reasons for the modifications to the facility owner/operator.

The facility owner/operator and Ecology may agree to incorporate additional, informal review and comment steps in the closure plan approval process. For example, many facility owner/operators choose to coordinate informally with Ecology prior to submitting a closure plan for the initial 90 day review. Ecology has found that such informal coordination can significantly increase the quality of initial closure plan submittals and reduces the number of formal Ecology comments.

## **2.3 Public Participation**

Ecology is responsible for providing meaningful opportunities for the public to review and comment on closure activities. Ecology notifies the public of their opportunity to review and comment on closure activities through a newspaper notice. At final status permitted facilities, the public's opportunity for review of closure plans typically occurs during the public review and comment associated with issuance of the final status permit and/or as part of any major modifications to the final status permit. For facilities operating under interim status, Ecology must provide a thirty (30) day public comment period to give interested persons an opportunity to review and comment on the tentative decision to approve any given closure plan. Significant changes to approved interim status closure plans are subject to additional public review.

Final Ecology approval of closure plans must include consideration of all comments, received during the public comment period.

## **2.4 Amending Closure Plans**

Facility owner/operators can amend their closure plan at any time prior to the notification of intent to begin partial or final closure. Facility owner/operators must amend closure plans whenever.

- (1) A change in facility design or operating plan(s) affects the closure plan;
- (2) There is a change in the expected year of closure; and/or

- (3) Unexpected events encountered during closure activities require a modification of the closure plan.

Facility owner/operators who amend their unapproved closure plans do so at their discretion. Facility owner/operators who wish to amend their Ecology-approved closure plans must submit an amended plan to Ecology with a written request for Ecology review and approval. All amendments and changes to approved interim status closure plans are subject to the review, approval, and public notice procedures discussed above. Amendments and changes to final status closure plans are subject to applicable requirements for permit modification.

## **2.5 Activities Conducted Prior to Closure Plan Approval**

Closure plan approval (see section 2.2) and closure notification (see section 7.1) are required; however, facility owner/operators may conduct activities, including removing wastes and decontaminating or dismantling equipment and structures at any time prior to closure. Provided Ecology determines that such activities were conducted in accordance with the requirements for closure, they could be approved in the subsequently submitted closure plan.

In order for Ecology to make such determinations, facility owner/operators must keep detailed records documenting that all activities conducted prior to closure plan approval are consistent with closure requirements. Information maintained to support consistency with the closure requirements should, at a minimum, include the information required for closure certification, as discussed in section 7.4 of this guidance.

Ecology cannot accept activities if they are inconsistent with the closure regulations or if adequate information is not available to support a determination of consistency with closure requirements. If Ecology determines activities were inconsistent with the closure requirements and/or if adequate information is not available to determine consistency, Ecology can require facility owner/operators to conduct additional activities, including, but not limited to, removal and/or decontamination of wastes, waste residues, equipment and/or structures, additional sampling and analysis, and/or investigatory activities designed to determine the degree to which previously conducted activities comply with closure requirements. See WAC 173-303-610(3)(c)(iv) and 40 CFR § 265.112(e) as referenced by WAC 173-303-400.

Ecology emphasizes that facility owner/operators can incur considerable liabilities when they choose to conduct removal and/or decontamination prior to closure plan review and approval. Facility owner/operators are encouraged to work closely with Ecology formally and informally to develop closure strategies which are appropriate for their facility specific conditions.

### **3.0 CLOSURE PERFORMANCE STANDARD**

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The closure performance standard is found at WAC 173-303-610(2). According to the closure performance standard, all dangerous waste management units and facilities must be closed in a manner that:

- (1) Minimizes the need for further maintenance;
- (2) Controls, minimizes, or eliminates to the extent necessary to protect human health and the environment, post-closure escape of dangerous waste, dangerous constituents, leachate, contaminated run-off, and dangerous waste decomposition products to the ground, surface water, ground water, and atmosphere; and
- (3) Returns the land to the appearance and use of surrounding land areas to the degree possible given the nature of the previous dangerous waste activity.

In addition to compliance with the performance standard, clean closure requires the removal or decontamination of all dangerous waste, waste residues and equipment, bases, liners, soils/ subsoils and other material containing or contaminated with dangerous waste or waste residue. Ecology will consider removal and decontamination complete when the concentrations of dangerous waste, dangerous waste constituents, and dangerous waste residues throughout the closing unit and throughout any areas affected by releases from the closing unit do not exceed numeric cleanup levels determined using residential exposure assumptions according to the Model Toxics Control Act (MTCA) Regulations, Chapter 173-340 WAC and all structures, equipment, bases, liners, and other materials containing or contaminated with dangerous wastes, constituents, or residues have met specific removal and decontamination standards approved by Ecology in accordance with WAC 173-303-610(2)(b)(ii).

#### **3.1 Clean Closure Levels**

According to WAC 173-303-610(2)(b)(i), numeric clean closure levels for soils, ground water, surface water, and air must be determined using residential exposure assumptions according to the Model Toxics Control Act (MTCA). The MTCA regulations provide three options for establishing site-specific cleanup levels, MTCA methods A, B, and C. Each method uses human health risk as the main factor in determining cleanup levels. Data on environmental risk are considered, when available. Each MTCA method also includes provisions for consideration of natural or area background, practical quantitation limits, and concentrations of individual hazardous substances established under applicable state and federal laws.

For cancer-causing substances, MTCA defines the acceptable risk level as a conservative estimate of a person's chances of developing cancer during a lifetime of constant exposure. If more than one contaminant is present on a site, the total health risk from all cancer-causing substances must be considered when determining cleanup levels.

For non-carcinogenic substances, the MTCA cleanup level for each substance at a site must be below that which could cause illness in humans. If more than one substance at a site affects the body in the same way, the effect of all those substances combined must be considered when determining cleanup levels.

Facility owner/operators who wish to demonstrate clean closure must develop numeric cleanup levels for dangerous wastes and dangerous waste constituents using residential exposure assumptions under MTCA method A or B. In order for Ecology to approve the clean closure certification, these cleanup levels must be met throughout the closing unit and any areas affected by releases from the closing unit. The MTCA method A and B cleanup standards for determining site- and media-specific cleanup levels are found in WAC 173-340-700 through -760. The following sections of Chapter 173-340 WAC are referenced in the WCA cleanup standards but do not apply to clean closure: 130, 350, 360, 410, and 440. In addition, MTCA method C and WAC 173-340-745 are not appropriate for clean closure.

### **3.2 MTCA Method A**

Use of MTCA method A is limited to routine closures at sites with relatively few dangerous waste constituents or closures where numerical standards are available in the MTCA regulations or other applicable state and federal laws for all indicator dangerous waste constituents in all media of concern.

#### **3.2.1 Definition of Routine**

A routine closure is any closure that Ecology determines meets the MTCA definition of a routine cleanup. Under MTCA, a cleanup may be considered routine if.

- (1) It involves an obvious and limited choice among cleanup methods;
- (2) It uses a cleanup method that is reliable and has proven capable of accomplishing the cleanup standard;
- (3) Cleanup standards for each hazardous substance addressed by the cleanup are obvious and undisputed, and allow an adequate margin of safety for protection of human health and the environment;
- (4) Ecology has experience with similar actions; and
- (5) The action does not require an environmental impact statement.

Routine cleanups may include one or more of the following activities: Cleanup of above-ground structures; cleanup of below-ground structures; cleanup of contaminated soils where the cleanup will restore the site to cleanup levels; or cleanup of solid wastes, including containers. For additional information on the MTCA definition of routine, see WAC 173-340-130(7)(b).

Ecology believes that very few closures meet the criteria for “routine.” Ecology may consider closure of a container storage area with little or no contamination of the containment system routine. Closures involving groundwater remediation and/or decontamination of structures will not normally be considered routine.

### **3.2.2 Clean Closure Levels - MTCA Method A**

Clean closure levels established using MTCA method A must, at a minimum, meet all of the following:

- (6) Concentrations of individual dangerous waste constituents listed in the method A tables in WAC 173-340-720 or WAC 173-340-740;
- (7) Concentrations of individual dangerous waste constituents established under applicable state and federal laws; and
- (8) For individual dangerous waste constituents which do not meet the conditions in paragraphs one or two, concentrations that do not exceed natural background concentrations or the practical quantitation limit (PQL) for the dangerous waste constituent in question.

Guidance on use of PQU in determining MTCA method A cleanup levels is available from Ecology.

### **3.2.3 Misuse of the MTCA Method A Tables**

Care should be taken not to misuse the MTCA method A tables. The MTCA method A tables were developed for specific purposes, they are intended to provide conservative cleanup levels for sites undergoing routine cleanup actions and/or sites with relatively few hazardous substances. The method A tables should not automatically be used to define clean closure levels.

## **3.3 MTCA Method B**

MTCA method B may be used to establish clean closure levels at any dangerous waste management unit or facility. Clean closure levels established using method B must, at a minimum, meet all of the following:

- (1) Concentrations of individual dangerous waste constituents established under applicable state and federal law;
- (2) Concentrations which are estimated to result in no adverse effects on the protection and propagation of aquatic and terrestrial life; and
- (3) For dangerous waste constituents for which sufficiently protective health-based criteria or standards have not been established under applicable state and federal laws, concentrations which protect human health and the environment as specified in WAC 173-340-705, excluding the references to WAC 173-340-745.

When establishing clean closure levels using MTCA method B, the excess cancer risk from individual carcinogens cannot exceed one-in-one-million ( $10^{-6}$ ); if more than one type of carcinogenic dangerous waste constituent is present or there is more than one exposure pathway, the total excess cancer risk from the unit may not exceed one in one-hundred-thousand ( $10^{-5}$ ). For non-carcinogens, MTCA method B clean closure levels cannot exceed the concentration at which a constituent could cause acute or chronic toxic effects on human health and the hazard index of dangerous waste constituents with similar toxic effects cannot exceed one (1).

### **3.4 Adjusting Constituent Concentrations to Meet the Cleanup Standards**

In order to meet the MTCA cleanup standards, clean closure levels for individual dangerous waste constituents may need to be adjusted downward to take into account exposure from multiple pathways and to multiple dangerous constituents. Any such adjustments should be made in accordance with the procedures in WAC 173-340-708(4).

### **3.5 Natural Background**

Natural background concentrations of dangerous waste constituents may be considered when establishing clean closure levels. MTCA defines natural background as, “the concentration of hazardous substance consistently present in the environment which has not been influenced by localized human activities.” (See WAC 173-340-200)

### **3.6 Indicator Constituents**

Certification of clean closure must consider all dangerous waste, dangerous waste constituents, and dangerous waste residues (including decomposition products) generated or managed at the facility and within individual units at the facility; however, the closure process can often be expedited through use of indicator constituents. Indicator constituents are constituents proposed by the facility owner/operator and approved by Ecology as representative of the wastes managed at the closing unit and their degradation products. For information on selecting indicator constituents please refer to section 6.7 of this guidance.

### **3.7 Pre-Existing Contamination**

In some cases, hazardous substances may have been present at the location of a dangerous waste management unit before the unit was constructed or before the dangerous waste management occurred. In other cases, hazardous substances may have migrated to the unit from another, unrelated, source. In these cases, clean closure of individual units may occur provided:

- (1) All dangerous wastes, constituents, and waste residues which originated from the unit or waste management activities associated with the unit are removed to appropriate clean closure levels; and
- (2) The facility owner/operator demonstrates to Ecology’s satisfaction that the remaining contamination did not emanate from the closing unit and was not in any way caused by waste management activities at the closing unit.



A facility owner/operator's obligations for closure at any given unit are fulfilled when Ecology accepts a unit-specific clean closure certification. If pre-existing contamination remains at the clean-closed unit in concentrations above appropriate MTCA cleanup levels, the unit is subject to additional remediation under RCRA corrective action, MTCA, or CERCLA, as appropriate. Ecology encourages facility owner/operators to work closely with the Department during closure activities to ensure that all contamination at closing units is appropriately addressed and to minimize the need for additional remedial activities after closure.

### **3.8 Post-Closure Care**

Post-closure care is required when dangerous wastes or waste residues are left in place at a closed dangerous waste management unit. Ecology considers dangerous waste or waste residues left in place when dangerous waste constituents, residues, or decomposition products at the closed unit remain at concentrations above numeric cleanup levels determined using residential exposure assumptions under WCA method A or B. A post-closure permit is typically required to ensure appropriate post-closure care.

This guidance does not address post-closure care or permitting. Facility owner/operators who believe that clean closure is not feasible are encouraged to work closely with Ecology to determine appropriate post-closure care requirements.



## 4.0 REMOVAL

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In the case of most non-land based units (e.g., tanks and containers) and many land based units (e.g., surface impoundments and waste piles), the first step of the closure process will be to remove all waste from the closing unit. When removal of all waste is required, Ecology will expect facility owner/operators to use all practical and appropriate methods to remove the waste. In the case of removing waste from a tank, such methods could include, but are not limited to, pumping, pouring, scraping, and shoveling. After waste is removed from the closing unit, the unit and all equipment, bases, liners, soils/subsoils, and all other materials containing or contaminated with dangerous wastes or waste residue must also be removed or must undergo decontamination. Decontamination procedures are discussed in detail in section 5 of this guidance.

All wastes, waste residues, debris, and contaminated media generated during closure activities must be managed in accordance with all applicable requirements including applicable requirements in Chapter 173-303 WAC and applicable Federal hazardous waste requirements. Wastes removed from regulated units will continue to carry the dangerous waste codes which were associated with the wastes managed in the units and remain subject to all applicable dangerous waste regulatory requirements.

As discussed in section 2.1 of this guidance, a facility owner/operator who intends to clean close a dangerous waste management unit must fully describe each step in removing waste and waste residues. As necessary the closure plan must also include descriptions of equipment, structures, and contaminated environmental media removal. These descriptions must include estimates of the volumes and types of waste, hazardous debris, waste residue, and contaminated equipment, structures, and media which will be removed during closure. Each step in the removal process should be fully described, including, but not limited to, staging and containerization of waste or reagents, equipment to be used, removal pattern and depth increments, and management of loading areas. The closure plan should also describe provisions which will be taken to minimize and/or prevent emissions of dangerous waste and dangerous constituents during closure activities. For example, if waste management activities during closure will include loading and transport of contaminated materials in trucks, the closure plan should describe the steps which will be taken to minimize air emissions from windblown dust.

### 4.1 Waste Minimization

The management of waste generated during the closure process must include consideration of Ecology's waste management hierarchy. Ecology's waste management hierarchy emphasizes recycling and treatment over land disposal and includes the following waste management priorities, in order of diminishing preference:

- (1) Waste reduction;
- (2) Waste recycling;
- (3) Physical, chemical, and biological treatment;

- (4) Incineration;
- (5) Solidification/stabilization treatment; and
- (6) Landfill.

Utilization of an approach higher on the waste management hierarchy could be used as a basis for requesting additional time for closure (see section 7.3 of this guidance) if such additional time were necessary to implement the higher priority -approach.

## **4.2 Contaminated Environmental Media**

Contaminated environmental media which contain dangerous waste must be managed as dangerous waste unless or until they no longer contain the waste and do not exhibit a dangerous waste characteristic or criteria, or are delisted. Not all contaminated environmental media generated during closure will necessarily require management as dangerous waste. Facility owner/operators should carefully consider the conditions at their closing units, and work with Ecology to determine the regulatory status of contaminated environmental media. As noted in section 4.1, Ecology encourages facility owner/operators to consider recycling and/or reuse of contaminated environmental media generated during closures.

### **4.2.1 Contained-in Policy for Media**

Facility owner/operators may demonstrate that contaminated environmental media generated during closure activities do not or no longer contain dangerous waste and therefore do not require further regulatory control or decontamination (this demonstration is referred to as a “contained-in demonstration”). Ecology reviews demonstrations that contaminated media no longer contain dangerous waste on a case-by-case basis, in consideration of the facility and waste specific circumstances. Facility owner/operators must continue to manage contaminated media as dangerous waste until they receive a written determination by Ecology that the media in question does not or no longer contains dangerous waste (this decision is referred to as a “contained-in determination”). Ecology typically bases contained-in determinations on a comparison of the concentrations of hazardous substances of concern in the media to MTCA residential cleanup standards. Ecology may determine that the media in question no longer contains dangerous waste when the concentrations of dangerous constituents in the media fall below cleanup levels determined using residential exposure assumptions according to the MTCA regulations and the media does not exhibit a dangerous waste characteristic or criteria.

Facility owner/operators may submit a request for, and information supporting, a contained-in determination in the closure plan. Provided the supporting documentation is adequate, Ecology can include contained-in determinations in closure plan approvals. Ecology can also consider contained-in demonstrations during or after implementation of closure activities. Facility owner/operators who believe the contained-in policy may be applied to their closures are encouraged to work closely with Ecology to develop adequate information to support a contained-in determination.

### 4.3 Hazardous Debris

EPA has promulgated rules governing the application of the hazardous waste Land Disposal Restrictions (LDR) to hazardous debris. These rules are in effect in Washington State and are presently being implemented by the EPA Region 10 in conjunction with Ecology. Debris is defined as solid material (in the physical sense) which exceeds 60 mm (2.5 inches) particle size and intended for disposal. Hazardous debris is defined as debris which is contaminated with listed hazardous waste or which itself exhibits a hazardous characteristic. Not all debris generated during the closure process will meet the definition of hazardous debris. Facility owner/operators should plan on working closely with Ecology to determine the regulatory status of debris and other materials generated during the closure process and are encouraged to consider recycling or reuse of such materials.

Facility owner/operators have three options for managing hazardous debris:

- (1) Most listed and/or characteristic hazardous debris can be treated using an appropriate technology listed in 40 CFR 268.45 Table 1. If the debris is treated using an approved extraction or destruction technology, it need not be managed as a dangerous waste after treatment, providing it meets the technology specific performance and/or operating standard(s) and does not exhibit a dangerous waste characteristic or criteria. 40 CFR 268.45 Table 1 is reprinted on pages 26 and 27 of this guidance.
- (2) Hazardous debris may be treated to meet the constituent-specific LDR treatment standard for the waste or waste-specific constituents contaminating the debris; however, such debris, even after treatment, may still be considered a dangerous waste under Chapter 173-303 WAC and may require management at a facility permitted to manage dangerous waste.
- (3) Facility owner/operators may ask Ecology to apply the “contained-in” policy for hazardous debris. Using the contained-in policy, Ecology can determine, on a case-by-case basis, that the hazardous debris does not or no longer contains dangerous waste and does not require management as a dangerous waste. For more information on the contained-in policy for hazardous debris, please see below.

For more information on LDR treatment requirements for hazardous debris, refer to 57 FR 37194 (August 18, 1992) or contact a hazardous waste specialist at your Ecology Regional Office or at EPA Region 10.

#### 4.3.1 Contained-in Policy for Hazardous Debris

The contained-in policy for hazardous debris is similar to the contained-in policy for contaminated environmental media discussed in section 4.2.1, above. Ecology will typically base contained-in determinations for debris on the history of the unit undergoing closure, the concentrations of dangerous constituents present, potential routes of exposure to such dangerous constituents, and other applicable information. There are no standards which are routinely used to define contained-in concentrations for hazardous debris. In the absence of clear standards, Ecology believes that soil cleanup levels determined under MTCA using residential exposure assumptions represent very conservative assessment of the potential

risks posed by debris. If the concentrations of dangerous constituents in debris are below MTCA residential cleanup levels, Ecology will likely determine that the debris no longer contains dangerous waste. Facility owner/operators who choose this option are encouraged to work closely with Ecology to develop appropriate supporting information. Ecology emphasizes that MTCA residential soil cleanup standards should not automatically be used to define contained-in concentrations for hazardous debris. Ecology may make contained-in determinations for hazardous debris based only on facility- and debris-specific considerations and in the absence of a comparison of concentrations of hazardous constituents in the debris to MTCA cleanup levels.

#### **4.4 The Empty Container Rule**

The empty container rule is found at WAC 173-303-160. Under the empty container rule, a container is considered “empty” when all wastes have been removed that can be removed using practices commonly employed to remove materials from that type of container and there is either less than one inch of waste remaining in the container or less than 1 percent of the container’s capacity of waste remains in the container, whichever is less.<sup>1</sup>

Tanks are not considered “containers” for purposes of the empty container rule. Achievement of the performance standard and specific requirements of the empty container rule does not remove the obligation to decontaminate closing container storage areas, container systems, and ancillary equipment.

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<sup>1</sup> If the total capacity of the container is greater than 110 gallons, the amount of waste remaining in the container may not exceed 0.3 percent of the container’s total capacity.

## **5.0 DECONTAMINATION**

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In the past, Ecology and the regulated community have struggled to make numerous site specific decisions regarding the methods and degrees of decontamination which are necessary in a clean closure scenario. The purpose of the following decontamination guidance is to provide minimum decontamination standards for use during closure. Although decontamination approvals will still involve site specific considerations, Ecology believes that clearly defining minimum standards will significantly improve and expedite the closure plan approval process.

As discussed in section 2.1 of this guidance, a facility owner/operator who intends to clean close a dangerous waste management unit must fully describe each step in removing waste and waste residues and removing or decontaminating equipment, structures, and contaminated environmental media from the unit in the closure plan. These descriptions must include estimates of the volumes and types of waste, hazardous debris, waste residue, and contaminated equipment, structures, and media which will be removed or decontaminated during closure. Descriptions of staging and containerization of waste or reagents, equipment used, removal pattern and depth increments, loading areas and any other steps critical to removal and/or decontamination must also be included. The closure plan should clearly explain how debris and contaminated media will be decontaminated, stored, loaded, and managed, both at the unit and after it leaves the facility (as applicable). For example, if the chosen decontamination method is high pressure steam, the closure plan should detail the temperature, pressure, and duration of the high pressure steam decontamination and discuss any use of surfactants or detergents. The closure plan should describe provisions which will be taken to minimize and/or prevent emissions of dangerous waste and dangerous constituents during closure activities. For example, if decontamination activities will include water washing, the closure plan should fully describe the steps which will be taken to prevent release of wash waters to the environment.

### **5.1 Unit Inspection Prior to Decontamination**

Prior to beginning decontamination, but after wastes have been removed, facility owner/operators must visually inspect the closing unit to identify all cracks and other openings through which waste, debris, or decontamination media (such as wash water) could be released to the environment. If cracks or other openings are found at the closing unit, the facility owner/operator may be required to seal or repair the cracks or other openings to prevent releases prior to or during decontamination of the unit.

Facility owner/operators must maintain a record of the location and dimension of all cracks or other openings identified during closure because these areas are considered to have a higher potential for allowing releases of dangerous waste from the closing unit and may require more focused sampling and analysis during closure. The records may be kept in the facility operating record or in the field notebook discussed in section 6.10.1 of this guidance. Facility owner/operators must investigate and evaluate all cracks and other openings identified during closure to determine if releases of dangerous waste or dangerous waste constituents have occurred at or from the closing unit.

Facility owner/operators should include procedures for inspecting all units prior to decontamination, recording releases and potential releases, and reporting such releases and potential releases to Ecology in the closure plan.

## **5.2 Decontamination Standards**

In a continuing effort to build consistency into the dangerous waste regulatory program, Ecology has chosen to reference the “Alternative Treatment Standards for Hazardous Debris,” as promulgated by EPA in the August 18, 1992 Federal Register (57 FR 37194) as the minimum decontamination standards for closure. The Alternative Treatment Standards for Hazardous Debris are summarized in 40 CFR § 268.45 Table 1, which is reprinted at the end of this section on pages 23 through 26.

Ecology recognizes that not all materials requiring decontamination during closure will meet the regulatory definition of hazardous debris.<sup>2</sup> For example, materials requiring decontamination during closure may include structures, such as concrete containment systems, which are not intended for disposal. Although these structures will not meet the regulatory definition of hazardous debris, they still require adequate and appropriate decontamination during closure. Ecology believes the Alternative Treatment Standards for Hazardous Debris represent the best demonstrated available technology (BDAT) for materials typically subject to decontamination during the closure process and, as such, are appropriate minimum standards for closure decontamination regardless of the regulatory status of the materials in question. EPA contemplated application of the Alternative Treatment Standards for Hazardous Debris to the closure process when they wrote in the preamble to the August 18, 1992 rule:

“The Agency (EPA) believes that the treatment methods in today’s rule would always satisfy the decontamination standard in the closure provisions. After all, the purpose of these treatment methods is to decontaminate. EPA also interprets the land disposal and closure rules to require that all hazardous debris be treated to meet the debris treatment standards, even if the debris is generated during closure.” (57 FR 37243)

## **5.3 Compliance with Decontamination Standards**

Ecology believes that materials requiring decontamination during the closure process may include, but will not be limited to, glass, metal, plastic, rubber, brick, cloth, concrete, pavement, rock, and wood. Ecology will consider such materials decontaminated if they have been treated using an appropriate extraction or destruction technology (as specified below and in 40 CFR § .268.45 Table 1), meet the technology specific performance, design, and/or operating standards and, if intended for disposal, the material does not exhibit a dangerous waste characteristic or criteria. Ecology believes this is consistent with EPA’s determination that, after treatment with most extraction and destruction treatment technologies, hazardous debris will no longer be subject to regulation as a hazardous waste (e.g., appropriately treated debris can be recycled, reused, or land disposed in a solid waste landfill without further control under the federal hazardous waste regulations).

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<sup>2</sup> See Section 4.3 of this guidance for a discussion of the regulatory definition of “hazardous debris.”



Materials decontaminated using an immobilization technology could be subject to long-term monitoring requirements under a post-closure scenario. Requiring long-term monitoring for materials treated using an immobilization technology is consistent with EPA's determination that treatment using an immobilization technology will be adequate to comply with LDR treatment requirements, but the treated debris will remain subject to regulation as hazardous waste (e.g., can be land disposed only at a facility permitted to manage hazardous waste).

Facility owner/operators who choose to decontaminate material using biodegradation, chemical destruction (which includes chemical oxidation and chemical reduction), or decontaminate dioxin wastes using thermal destruction, must prepare a demonstration of equivalent technology. The demonstration of equivalent technology should be included in the closure plan and should document that the proposed technology treats the material undergoing decontamination such that residual concentrations of hazardous contaminants will not pose a hazard to human health and the environment. If the material undergoing decontamination is considered hazardous debris and the purpose of the proposed decontamination method is, in part, to satisfy LDR treatment requirements, the demonstration must be prepared in accordance with the requirements of 40 CFR § 268.42(b).

#### **5.4 Decontamination and Compliance with the LDR**

Facility owner/operators who chose to decontaminate debris using an appropriate extraction or destruction treatment technology from 40 CFR § 268.45 Table 1 will have the advantage of concurrently complying with LDR treatment standards, per any applicable restrictions in the federal regulations. Facility owner/operators who choose to decontaminate materials using a treatment technology other than the appropriate extraction or destruction technology from 40 CFR § 268.45 Table 1 could, subject to Ecology review and approval, fulfill closure requirements but may have continuing obligations under the federal LDR program.

Remember, while requirements for removal and/or decontamination during closure apply to all dangerous waste, dangerous waste constituents and dangerous waste residues (including decomposition products) and all equipment, bases, liners, soils/subsoils, or other material containing or contaminated with dangerous waste, constituents or residues, only materials intended for disposal are subject to LDR requirements. Facility owner/operators are encouraged to work closely with Ecology to identify, early in the closure process, materials intended for discard or disposal so LDR compliance can be considered when developing site-specific closure decontamination strategies.

#### **5.5 Other Decontamination Methods & Equivalent Technology Demonstrations**

Instead of relying on the Alternative Treatment Standards for Hazardous Debris, facility owner/operators may wish to propose other decontamination methods or, some facility owner/operators may decide to use the Alternative Treatment Standards for Hazardous Debris but propose other design, operating, or performance standards. At a minimum, requests for approval of other decontamination methods and/or other design, operating and performance standards should include:

- (1) Information demonstrating that the proposed decontamination method or standard is in compliance with the closure performance standard at WAC 173-303-610(2), including information demonstrating that the proposed decontamination method or standard will control, minimize, or eliminate post-closure escape of dangerous waste, dangerous constituents, leachate, contaminated run-off, and dangerous waste decomposition products to the ground, surface water, ground water, and atmosphere.
- (2) Information demonstrating that the proposed decontamination method or standard is in compliance with federal, state, and local requirements; and
- (3) Information demonstrating that the proposed decontamination method or standard is protective of human health and the environment.

Based on such information and any other available or requested information, Ecology may approve the use of the proposed decontamination method or standard. All approvals will be in writing and may contain such provisions and conditions as Ecology deems appropriate. If adequate information is provided in the closure plan, Ecology can grant such approval during the closure plan review process.

If the material undergoing decontamination is considered hazardous debris and the purpose of the proposed decontamination method is, in part, to satisfy LDR treatment requirements, the documentation must include a demonstration of equivalent technology prepared in accordance with the requirements of 40 CFR § 268.42(b).

## **5.6 Sampling**

Ecology may require sampling of material subject to decontamination to determine the nature and extent of contamination present in the material and/or to confirm the adequacy of any decontamination method. For example, chip sampling of concrete containment systems and/or rinsate sampling for tank decontamination may be required.

Ecology recognizes that sampling of many materials typically subject to decontamination during closure may be problematic. Ecology emphasizes that the advantage of using an appropriate extraction or destruction technology from 40 CFR § 268.45 Table 1 for closure decontamination is treated material may exit the dangerous waste regulatory system and sampling will not typically be required.

If facility owner/operators anticipate sampling will be necessary during closure decontamination, they should propose sampling methods in the sampling and analysis portion of the closure plan. For more information on sampling and analysis considerations, please see section 6 of this guidance.

## **5.7 Decontamination Residuals**

Residuals from decontamination (e.g., rinse-water) may be subject to regulation as dangerous waste and may be required to carry the dangerous waste codes associated with the waste managed in the unit(s) undergoing closure. Facility owner/operators should work closely with Ecology to determine the regulatory status of decontamination residuals generated during

closure. As discussed in section 2.1 of this guidance, procedures for collection and management of decontamination residuals should be included in the closure plan.

## **5.8 Decontamination of Concrete Containment Structures**

Ecology believes that decontamination of concrete containment structures will be the most common type of closure decontamination. Alternative Treatment Technologies for Hazardous Debris appropriate to concrete include: abrasive blasting using water to propel abrasive media, scarification, grinding and planing, vibratory finishing, and high pressure steam and water sprays (considered physical extraction technologies); and water washing and spraying and liquid or vapor phase solvent extractions (considered chemical extraction technologies). Performance, design, and/or operating standards for physical and chemical extraction technologies are specified in 40 CFR 268.45 Table 1 (reprinted on pages 23 through 26 of this guidance).

The performance standards for physical extraction technologies are based on removal of the contaminated layer of debris. The physical extraction performance standard for concrete is removal of 0.6 cm. of the debris surface layer and treatment to a “clean debris surface.”<sup>3</sup> EPA has determined that the treatment performance standard for physical extraction technologies cannot be met by treating concrete with high pressure steam and/or water spray; however, facility owner/operators who believe that high pressure steam and/or water spray treatment will achieve an adequate level of concrete decontamination at their facility can propose a more appropriate performance standard as discussed in section 5.5 of this guidance.

The performance standards for chemical extraction are based on dissolution of contaminants in the cleaning solution. The chemical extraction performance standard for concrete requires treatment to a “clean debris surface,” limits the thickness of the concrete to 1.2 cm, and requires that the dangerous constituents being addressed are soluble to at least 5% by weight in the water solution, emulsion, or solvent as applicable. Facility owner/operators who believe that an adequate level of concrete decontamination can be achieved through water washing and spraying of concrete which is greater than 1.2 cm thick can propose an alternative performance standard or decontamination method as discussed in section 5.5 of this guidance.

### **5.8.1 Contained-in Policy**

Depending on the condition and degree of contamination present in the concrete, facility owner/operators may wish to use the contained-in policy to demonstrate to Ecology that their concrete containment system does not require decontamination because it does not contain dangerous waste. Facility owner/operators can also propose contained-in demonstrations for concrete which has been treated or decontaminated (using any treatment or decontamination method except dilution) so that it no longer contains dangerous waste.

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<sup>3</sup> “clean debris surface” means the surface, when viewed without magnification, is free of all visible contaminated soil and dangerous waste except that residual staining from soil and waste consisting of light shadows, slight streaks, or minor discolorations, and soil and waste in cracks, crevices, and pits may be present provided that such staining and waste and soil in cracks, crevices, and pits shall be limited to 5% of each square inch of surface area. See 40 CFR § 268.45 Table 1, Footnote 3.

Ecology will make contained-in determinations for concrete containment systems on a case-by-case basis after considering the history of the unit, the dangerous constituents present and/or potentially present, potential routes of exposure, and other pertinent information. There are no standards which are routinely used to define contained-in concentrations for concrete; however, Ecology believes that soil cleanup levels determined under MTCA using residential exposure assumptions represent very conservative assessments of the potential exposure risks posed by concrete. If the concentrations of dangerous constituents of concern in concrete are below MTCA residential cleanup levels Ecology will likely determine that the concrete no longer contains dangerous waste.

If adequate information is provided, Ecology can make contained-in determinations as part of the closure plan approval process. For more information, please see the discussion of the contained-in policy in section 4.31 of this guidance.

## **5.9 Decontamination of Metal Tanks and Tank Systems**

Ecology believes decontamination of metal tanks, tank systems, and ancillary equipment (e.g., pumps, piping) will be a common part of the closure process. Alternative Treatment Technologies for Hazardous Debris appropriate for metal include: abrasive blasting, scarification, grinding and planing, spalling, vibratory finishing, and high pressure steam and water sprays (physical extraction) and water washing and spraying, liquid and vapor solvent extraction (chemical extraction).

The performance standard for physical and chemical extraction technologies is treatment to a “clean debris surface.” “Clean debris surface” is defined in footnote 3, on page 23 of this guidance.

Remember, the first step in the closure process is to remove all waste from the closing unit and visually inspect the unit for any cracks or other openings (see section 4 of this guidance). Waste removal and visual inspection must be completed before tank decontamination may begin. If you plan on going inside the tank to accomplish waste removal, visual inspection, or decontamination, you may be subject to regulations for worker safety and/or confined space entry under the Washington Industrial Safety and Health Administration and/or the federal Occupational Safety and Health Administration. To find out more about WISHA/OSHA regulations, you may contact the Washington Department of Labor and Industries at (206) 753-6502.

Table 1.--Alternative Treatment Standards For Hazardous Debris \1\

Technology description	Performance and/or design and operating standard	Contaminant restrictions \2\
<b>A. Extraction Technologies:</b>		
<b>1. Physical Extraction</b>		
a. <i>Abrasive Blasting:</i> Removal of contaminated debris surface layers using water and/or air pressure to propel a solid media (e.g., steel shot, aluminum oxide grit, plastic beads).	<i>Glass, Metal, Plastic, Rubber:</i> Treatment to a clean debris \3\ <i>Brick, Cloth, Concrete, Paper, Pavement, Rock, Wood:</i> Removal of at least 0.6 cm of the surface layer; treatment to a clean debris surface.\3\	<i>All Debris:</i> None.
b. <i>Scarification, Grinding, and Planing:</i> Process utilizing striking piston heads, saws, or rotating grinding wheels such that contaminated debris surface layers are removed.	Same as above	Same as above
c. <i>Spalling:</i> Drilling or chipping holes at appropriate locations and depth in the contaminated debris surface and applying a tool which exerts a force on the sides of those holes such that the surface layer is removed. The surface layer removed remains hazardous debris subject to the debris treatment standards.	Same as above	Same as above
d. <i>Vibratory Finishing:</i> Process utilizing scrubbing media, flushing fluid, and oscillating energy such that hazardous contaminants or contaminated debris surface layers are removed.\4\	Same as above.	Same as above.
e. <i>High Pressure Steam and Water Sprays:</i> Application of water or steam sprays of sufficient temperature, pressure, residence time, agitation, surfactants, and detergents to remove hazardous contaminants from debris surfaces or to remove contaminated debris surface layers.	Same as above.	Same as above.
<b>2. Chemical Extraction</b>		
a. <i>Water Washing and Spraying:</i> Application of water sprays or water baths of sufficient temperature, pressure, residence time, agitation, surfactants, acids, bases, and detergents to remove hazardous contaminants from debris surfaces and surface pores or to remove contaminated debris surface layers.	<i>All Debris:</i> Treatment to a clean debris surface \3\ <i>Brick, Cloth, Concrete, Paper, Pavement, Rock, Wood:</i> Debris must be no more than 1.2 cm (\1/2\ inch) in one dimension (i.e., thickness limit, \5\ except that this thickness limit may be waived under an "Equivalent Technology" approval under Sec. 268.42(b);\8\ debris surfaces must be in contact with water solution for at least 15 minutes.	<i>Brick, Cloth, Concrete, Paper, Pavement, Rock, Wood:</i> Contaminant must be soluble to at least 5% by weight in water solution or 5% by weight in emulsion; if debris is contaminated with a dioxin-listed waste,\6\ an "Equivalent Technology" approval under Sec. 268.42(b) must be obtained.\8\
b. <i>Liquid Phase Solvent Extraction:</i> Removal of hazardous contaminants from debris surfaces and surface pores by applying a nonaqueous liquid or liquid solution which causes the hazardous contaminants to enter the liquid phase and be flushed away from the debris along with the liquid or liquid solution while using appropriate agitation, temperature, and residence time.\4\	Same as above	<i>Brick, Cloth, Concrete, Paper, Pavement, Rock, Wood:</i> Same as above, except that contaminant must be soluble to at least 5% by weight in the solvent.
c. <i>Vapor Phase Solvent Extraction:</i> Application of an organic vapor using sufficient agitation, residence time, and temperature to cause hazardous contaminants on contaminated debris surfaces and surface pores to enter the vapor phase and be flushed away with the organic vapor.\4\	Same as above, except that brick, cloth, concrete, paper, pavement, rock and wood surfaces must be in contact with the organic vapor for at least 60 minutes.	Same as above.

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### 3. Thermal Extraction

#### a. *High Temperature Metals Recovery:*

Application of sufficient heat, residence time, mixing, fluxing agents, and/or carbon in a smelting, melting, or refining furnace to separate metals from debris.

For refining furnaces, treated debris must be separated from treatment residuals using simple physical or mechanical means,<sup>9</sup> and, prior to further treatment, such residuals must meet the waste-specific treatment standards for organic compounds in the waste contaminating the debris.

*Debris contaminated with a dioxin-listed waste:*<sup>5</sup> Obtain an “Equivalent Technology” approval under Sec. 268.42(b).<sup>8</sup>

#### b. *Thermal Desorption:* Heating in an enclosed chamber under either oxidizing or nonoxidizing atmospheres at sufficient temperature and residence time to vaporize hazardous contaminants from contaminated surfaces and surface pores and to remove the contaminants from the heating chamber in a gaseous exhaust gas.<sup>7</sup>

*All Debris:* Obtain an “Equivalent Technology” approval under Sec. 268.42(b);<sup>8</sup> treated debris must be separated from treatment residuals using simple physical or mechanical means,<sup>9</sup> and, prior to further treatment, such residue must meet the waste-specific treatment standards for organic compounds in the waste contaminating the debris.

*All Debris:* Metals other than mercury.

*Brick, Cloth, Concrete, Paper, Pavement, Rock, Wood:* Debris must be no more than 10 cm (4 inches) in one dimension (i.e., thickness limit),<sup>5</sup> except that this thickness limit may be waived under the “Equivalent Technology” approval.

### B. Destruction Technologies:

#### 1. *Biological Destruction (Biodegradation):*

Removal of hazardous contaminants from debris surfaces and surface pores in an aqueous solution and biodegradation of organic or nonmetallic inorganic compounds (i.e., inorganics that contain phosphorus, nitrogen, or sulfur) in units operated under either aerobic or anaerobic conditions.

*All Debris:* Obtain an “Equivalent Technology” approval under Sec. 268.42(b);<sup>8</sup> treated debris must be separated from treatment residuals using simple physical or mechanical means,<sup>9</sup> and, prior to further treatment, such residue must meet the waste-specific treatment standards for organic compounds in the waste contaminating the debris.

*All Debris:* Metal contaminants.

*Brick, Cloth, Concrete, Paper, Pavement, Rock, Wood:* Debris must be no more than 1.2 cm (1/2 inch) in one dimension (i.e., thickness limit),<sup>5</sup> except that this thickness limit may be waived under the “Equivalent Technology” approval.

#### 2. Chemical Destruction

##### a. *Chemical Oxidation:* Chemical or electrolytic oxidation utilizing the following oxidation reagents (or waste reagents) or combination of reagents--(1) hypochlorite (e.g., bleach); (2) chlorine; (3) chlorine dioxide; (4) ozone or UV (ultraviolet light) assisted ozone; (5) peroxides; (6) persulfates; (7) perchlorates; (8) permanganates; and/or (9) other oxidizing reagents of equivalent destruction efficiency.<sup>4</sup> Chemical oxidation specifically includes what is referred to as alkaline chlorination.

*All Debris:* Obtain an “Equivalent Technology” approval under Sec. 268.42(b);<sup>8</sup> treated debris must be separated from treatment residuals using simple physical or mechanical means,<sup>9</sup> and, prior to further treatment, such residue must meet the waste-specific treatment standards for organic compounds in the waste contaminating the debris.

*All Debris:* Metal contaminants.

*Brick, Cloth, Concrete, Paper, Pavement, Rock, Wood:* Debris must be no more than 1.2 cm (1/2 inch) in one dimension (i.e., thickness limit),<sup>5</sup> except that this thickness limit may be waived under the “Equivalent Technology” approval.

b. <i>Chemical Reduction</i> : Chemical reaction utilizing the following reducing reagents (or waste reagents) or combination of reagents: (1) sulfur dioxide; (2) sodium, potassium, or alkali salts of sulfites, bisulfites, and metabisulfites, and polyethylene glycols (e.g., NaPEG and KPEG); (3) sodium hydrosulfide; (4) ferrous salts; and/or (5) other reducing reagents of equivalent efficiency.\4\	Same as above	Same as above
3. <i>Thermal Destruction</i> : Treatment in an incinerator operating in accordance with Subpart O of Parts 264 or 265 of this chapter; a boiler or industrial furnace operating in accordance with Subpart H of Part 266 of this chapter, or other thermal treatment unit operated in accordance with Subpart X, Part 264 of this chapter, or Subpart P, Part 265 of this chapter, but excluding for purposes of these debris treatment standards Thermal Desorption units.	Treated debris must be separated from treatment residuals using simple physical or mechanical means,\9\ and, prior to further treatment, such residue must meet the waste-specific treatment standards for organic compounds in the waste contaminating the debris.	<i>Brick, Concrete, Glass, Metal, Pavement, Rock, Metal</i> : Metals other than mercury, except that there are no metal restrictions for vitrification. <i>Debris contaminated with a dioxin-listed waste</i> .\6\ Obtain an “Equivalent Technology” approval under Sec. 268.42(b),\8\ except that this requirement does not apply to vitrification.
C. Immobilization Technologies:		
1. <i>Macroencapsulation</i> : Application of surface coating materials such as polymeric organics (e.g., resins and plastics) or use of a jacket of inert inorganic materials to substantially reduce surface exposure to potential leaching media.	Encapsulating material must completely encapsulate debris and be resistant to degradation by the debris and its contaminants and materials into which it may come into contact after placement (leachate, other waste, microbes). Leachability of the hazardous contaminants must be reduced.	None.
2. <i>Microencapsulation</i> : Stabilization of the debris with the following reagents (or waste reagents) such that the leachability of the hazardous contaminants is reduced: (1) Portland cement; or (2) lime/pozzolans (e.g., fly ash and cement kiln dust). Reagents (e.g., iron salts, silicates, and clays) may be added to enhance the set/cure time and/or compressive strength, or to reduce the leachability of the hazardous constituents.\5\		None.
3. <i>Sealing</i> : Application of an appropriate material which adheres tightly to the debris surface to avoid exposure of the surface to potential leaching media. When necessary to effectively seal the surface, sealing entails pretreatment of the debris surface to remove foreign matter and to clean and roughen the surface. Sealing materials include epoxy, silicone, and urethane compounds, but paint may not be used as a sealant.	Sealing must avoid exposure of the debris surface to potential leaching media and sealant must be resistant to degradation by the debris and its contaminants and materials into which it may come into contact after placement (leachate, other waste, microbes).	None.

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\1\ Hazardous debris must be treated by either these standards or the waste-specific treatment standards for the waste contaminating the debris. The treatment standards must be met for each type of debris contained in a mixture of debris types, unless the debris is converted into treatment residue as a result of the treatment process. Debris treatment residuals are subject to the waste-specific treatment standards for the waste contaminating the debris.

\2\ Contaminant restriction means that the technology is not BDAT for that contaminant. If debris containing a restricted contaminant is treated by the technology, the contaminant must be subsequently treated by a technology for which it is not restricted in order to be land disposed (and excluded from Subtitle C regulation).

\3\ “Clean debris surface” means the surface, when viewed without magnification, shall be free of all visible contaminated soil and hazardous waste except that residual staining from soil and waste consisting of light shadows, slight streaks, or minor discolorations, and soil and waste in cracks, crevices, and pits may be present provided that such staining and waste and soil in cracks, crevices, and pits shall be limited to no more than 5% of each square inch of surface area.

\4\ Acids, solvents, and chemical reagents may react with some debris and contaminants to form hazardous compounds. For example, acid washing of cyanide-contaminated debris could result in the formation of hydrogen cyanide. Some acids may also react violently with some debris and contaminants, depending on the concentration of the acid and the type of debris and contaminants. Debris treaters should refer to the safety precautions specified in Material Safety Data Sheets for various acids to avoid applying an incompatible acid to a particular debris/ contaminant combination. For example, concentrated sulfuric acid may react violently with certain organic compounds, such as acrylonitrile.

\5\ If reducing the particle size of debris to meet the treatment standards results in material that no longer meets the 60 mm minimum particle size limit for debris, such material is subject to the waste-specific treatment standards for the waste contaminating the material, unless the debris has been cleaned and separated from contaminated soil and waste prior to size reduction. At a minimum, simple physical or mechanical means must be used to provide such cleaning and separation of nondebris materials to ensure that the debris surface is free of caked soil, waste, or other nondebris material.

\6\ Dioxin-listed wastes are EPA Hazardous Waste numbers FO20, FO21, FO22, FO23, FO26, and FO27.

\7\ Thermal desorption is distinguished from Thermal Destruction in that the primary purpose of Thermal Desorption is to volatilize contaminants and to remove them from the treatment chamber for subsequent destruction or other treatment.

\8\ The demonstration "Equivalent Technology" under Sec. 268.42(b) must document that the technology treats contaminants subject to treatment to a level equivalent to that required by the performance and design and operating standards for other technologies in this table such that residual levels of hazardous contaminants will not pose a hazard to human health and the environment absent management controls.

\9\ Any soil, waste, and other nondebris material that remains on the debris surface (or remains mixed with the debris) after treatment is considered a treatment residual that must be separated from the debris using, at a minimum, simple physical or mechanical means. Examples of simple physical or mechanical means are vibratory or trommel screening or water washing. The debris surface need not be cleaned to a "clean debris surface" as defined in note 3 when separating treated debris from residue; rather, the surface must be free of caked soil, waste, or other nondebris material. Treatment residuals are subject to the waste-specific treatment standards for the waste contaminating the debris.



## **6.0 SAMPLING AND ANALYSIS FOR CLEAN CLOSURE**

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All closures will include a sampling and analysis component. At a minimum, sampling and analysis will be necessary to characterize the areal and vertical extent of contamination at and/or released from the closing unit and to confirm the effectiveness of closure activities.

### **6.1 Sampling and Analysis Plan**

All closure plans must include a sampling and analysis plan. Sampling and analysis plans should specify procedures which ensure that sample collection, handling, and analysis will result in data of sufficient quality to plan and evaluate closure activities at the facility. Sampling and analysis plans should be designed to define the nature, degree and extent of contamination at and from the closing unit to the fullest extent possible. The level of detail in the sampling and analysis plan should be commensurate with the complexity of conditions at the closing unit. Sampling and analysis plans must include information necessary to insure proper planning and implementation of sampling activities. All sampling and analysis plans should include the following information and rationale for each selection:

- (1) A statement of the purpose and objectives of the data collection;
- (2) Organization and responsibilities for the sampling and analysis activities;
- (3) Project schedule;
- (4) General information on selection of types of samples needed (i.e., grab or composite), and amount of samples to be analyzed;
- (5) General information on selection of sampling locations and method used to determine - where the sampling will occur;
- (6) Specific sampling approach and methods, including:
  - ▶ Sampling locations and a unique ID number for each location;
  - ▶ Protocols for sample labeling and chain of custody;
  - ▶ Procedures for installation of sampling devices;
  - ▶ Procedures for sample collection and handling;
  - ▶ Procedures for personnel and equipment decontamination;
  - ▶ Procedures for the management of waste materials generated by sampling activities;
  - ▶ Description and number of quality assurance and quality control samples, including blanks and duplicates;
  - ▶ Provisions for splitting samples, when appropriate; and

- ▶ Confirmational sampling to demonstrate clean closure.
- (7) Sampling and analysis procedures to confirm decontamination of tanks and concrete containment systems and other media or equipment (if required).
- (8) Procedures for analysis of samples and reporting of results, including:
  - ▶ Selection of a laboratory;
  - ▶ Identification and justification of parameters to be sampled and analyzed;
  - ▶ Physical and chemical properties of the wastes to be sampled;
  - ▶ Analytical techniques and procedures;
  - ▶ Detection or quantitation limits;
  - ▶ Quality assurance and quality control procedures; and
  - ▶ Data reporting procedures and, where appropriate, data validation procedures.

## **6.2 Designing a Sampling Program**

Sampling programs should be designed to determine the probable maximum horizontal and vertical extent of contamination at and from the closing unit. At the end of the closure process, additional sampling is typically required to confirm clean closure levels have been achieved.

When designing a sampling program, facility owner/operators should consider area-wide sampling, focused sampling, and sampling for hot spots. Knowledge of past management practices at the facility should help determine which type of sampling is the most appropriate. In many cases, a combination of sampling techniques will be required, for example, area-wide sampling of a closing unit could be combined with focused sampling at the location of a known release. Each type of sampling is discussed briefly in this guidance. Facility owner/operators are encouraged to rely on Ecology's *Sampling and Data Analysis Issues for Ecology Staff to Consider in Reviewing Independent Remediation Reports* (available September, 1994) for specific guidance on the preparation of sampling programs. For additional information on sampling, facility owner/operators may consult U.S. EPA (1986b), U. S. EPA (1984), and Schweitzer, et al. (1984).

### **6.2.1 Area-Wide Sampling**

During area-wide sampling, an imaginary sampling grid, three-dimensional if necessary, is imposed over the area to be sampled. The area to be sampled must encompass the closing unit and the maximum extent of any releases from the closing unit. Each node of the grid is a sampling location with an assigned number. Area-wide sampling is appropriate when the spatial distribution of contamination at or from the closing unit is uncertain.

Variations of area-wide sampling include random and systematic sampling. In these variations, only certain nodes in the grid are sampled. For random sampling, a computer can be used to choose each sample location randomly from the nodes on the grid. For systematic sampling, a repetitive pattern of sampling is established such that, for example, every fifth node on the grid is sampled.

### **6.2.2 Focused Sampling**

Focused sampling involves selective sampling of areas where contamination is expected or releases have been documented. Focused sampling should be conducted, in addition to grid sampling, where there is evidence of leaks or spills or potential for a dangerous waste constituent to migrate. Focused sampling could involve linear sampling along a drainage-way, boundary, or other linear dimension. Likely areas for focused sampling include, but are not limited to:

- (1) Containers, tanks, waste piles, or any other units (such as ancillary pipes) in contact with soil;
- (2) Below any sumps or valves;
- (3) Load or unload areas;
- (4) Storage units with underlying pavements or concrete that appears to be cracked or broken; and
- (5) Areas receiving runoff or discharge from dangerous waste management units, such as a ditch, a swale, or the discharge point down gradient from a pipe.

Evidence for additional areas of focused sampling could include:

- (1) Visual or olfactory evidence of contamination including evidence based on direct reading field instrumentation or field test kits;
- (2) Knowledge, such as reports by employees, inspectors, or others, that releases have or may have occurred;
- (3) Length of time the unit has been in existence;
- (4) Entries into the unit operating record; and
- (5) Soil gas surveys or soil borings.

For small units where there is documentation of the extent of contamination, Ecology may approve use of focused sampling exclusive of grid sampling.

### **6.2.3 Sampling for Hot Spots**

Hot spots (or small patches of higher-level contamination) may be encountered during area-wide or focused sampling. If hot spots are encountered or suspected, sampling programs can

be designed to delineate their size and location. The intensity of sampling for hot spots will depend on the anticipated size and/or number of hot spots. Detailed information on designing sampling plans for detection and characterization of hot spots can be found in Gilbert (1987).

### **6.3 Sampling to Determine or Confirm Clean Closure**

The area-wide approach outlined above is generally appropriate for sampling to determine or confirm that clean closure levels are achieved. The sampling grid used to determine or confirm clean closure should overlay contaminated areas discovered during the initial sampling at the unit.

If a sample collected during-closure confirmation exceeds the cleanup standard, then the area represented by the sample (subunit) will be considered to exceed cleanup standards and additional actions will be required. These additional actions could include removal of media followed by additional confirmational sampling, and/or additional sampling, or statistical analysis at the subunit or across the entire closing unit.

### **6.4 Statistical Guidelines**

Ecology will typically make decisions regarding clean closure by direct comparison of sampling data to the site specific clean closure levels. If contamination at or from the closing unit is widespread, Ecology may require that the Statistical Guidance for Ecology Site Managers (1992) be used to confirm that clean closure levels have been achieved.

When a background comparison is used to determine cleanup levels, then the Statistical Guidance for Ecology Site Managers (1,992) or an equivalent method must be used to confirm that clean closure levels have been achieved.

For more information on statistical analysis, facility owner/operators can consult U. S. EPA (1986b) and Schweitzer, et al. (1984).

### **6.5 Soil Sampling During Closure**

The following soil sampling considerations are specific to the closure process. Facility owner/operators are encouraged to rely on Ecology's *Sampling and Data Analysis Issues for Ecology Staff to Consider in Reviewing Independent Remediation Reports* (available September, 1994) and U.S. EPA (1989b) for more detailed guidance on soil sampling.

#### **6.5.1 Soil Sampling Under Structures**

Soil sampling locations at a closing unit will typically be located over structures as well as exposed soil. When sampling points (including sampling points determined by the grid system for area-wide sampling) overlay structures, Ecology may require the underlying soil be sampled. Soil sampling under structures should generally be conducted after cleaning and decontamination of the structure but before the structure is removed. Sampling of soils under structures will be done through holes bored in the overlying structure, if possible. For example, samples of soil overlain by concrete should be collected through holes bored in the

concrete. Sampling under structures must be conducted in a manner which minimizes disturbance to the underlying soil.

After any structure is removed, Ecology may inspect the underlying soil. Areas under documented spills and areas susceptible to releases will receive close scrutiny. Additional sampling and testing may be required if there are indications of discolored soil, the presence of wet areas, volatile emissions detected on field detection equipment, odor, or other signs of potential contamination.

### **6.5.2 Soil Sampling at Various Depths**

Ecology may require soil sampling at various depths to determine the extent of contamination. The intervals for sampling soil at various depths may be dependent on several factors, including:

- (1) Soil type and permeability;
- (2) Suspected magnitude of surface contamination;
- (3) Physical state of the waste and its mobility,
- (4) Groundwater level;
- (5) Length of time waste was present at the site; and
- (6) Relative toxicity of the waste.

If surface samples demonstrate contamination, then sampling must be conducted at depth intervals to determine the extent of contamination.

## **6.6 Groundwater Monitoring During Closure**

In the event of confirmed or potential soil contamination, groundwater monitoring may also be required to demonstrate or confirm clean closure. Groundwater monitoring may be required for any dangerous waste management unit, including those not subject to a regulatory requirement for groundwater monitoring under WAC 173-303-645 (e.g., a container storage unit). If the closing unit is already subject to ground water monitoring requirements, the well location frequency of sampling, or constituents for groundwater sampling may be modified during and/or after closure activities, as necessary, to verify that clean closure levels have been achieved. The duration and frequency of groundwater monitoring necessary to verify clean closure will be determined by Ecology on a case-by-case basis taking into account hydrogeologic conditions, waste characteristics, and other relevant factors.

When groundwater is contaminated, post-closure care will generally be required.

For additional information on sampling and evaluating groundwater, facility owner/operators are encouraged to refer to Ecology's *Sampling and Data Analysis Issues for Ecology Staff to Consider in Reviewing Independent Remediation Reports* (available September, 1994) and U.S. EPA (1988).

## **6.7 Selection of Constituents to be Analyzed**

The data developed to support clean closure certifications and other closure decisions must be of sufficient quality to withstand any scientific and/or legal challenges. An overview of analytical considerations is provided in this section. For additional information, Facility owner/operators may consult Ecology's *Guidelines and Specifications for Preparing Quality Assurance Plans* issued in 1991, document number 91-16.

Selection of the proper analytical constituents must reflect current and historic operations at the facility and closing unit. Certification of clean closure must consider all dangerous waste constituents generated or managed at the facility and within individual units at the facility; however, the closure process can often be expedited through use of indicator constituents. Indicator constituents are constituents proposed by the facility owner/operator and approved by Ecology as representative of the wastes managed at the closing unit and their degradation products. To recommend indicator constituents, the facility owner/operator must first conduct relatively broad-based sampling and analysis to gather information on conditions at the closing unit; therefore, the closing unit should first be sampled for the full suite of dangerous waste constituents generated or managed at the facility. For some units, this may include all the constituents listed in Appendix IX of 40 CFR 264 and/or WAC 173-303-9905.

Facility owner/operators should base their recommendations of indicator constituents on knowledge of the facility and closing unit and the results of the broad-based sampling discussed above. In most cases, indicator constituents will be those constituents which are most likely to have been released at or from the unit. For example, soil underlying an F006 surface impoundment might be analyzed for 1,1,1-trichloroethane, a solvent likely to be used at a plating facility in addition to constituents common to the listed F006 waste; or, soil at a unit used to manage chlorinated solvents might also be analyzed for vinyl chloride, a common breakdown product of chlorinated solvents.

When reviewing and approving indicator constituents, Ecology will consider the following:

- (1) The toxicological characteristic of the constituents that influence its ability to adversely affect human health or the environment relative to the concentration of the constituent at the closing unit;
- (2) The chemical and physical characteristics of the constituent which govern its tendency to persist in the environment;
- (3) The chemical and physical characteristics of the constituent which govern its tendency to move into and through environmental media;
- (4) The natural background concentrations of the constituent;

- (5) The thoroughness of testing for the constituent at the closing unit;
- (6) The frequency that the constituent has been detected at the closing unit; and
- (7) Degradation by-products of the constituent.

## **6.8 Approved Analytical Methods**

Samples should be analyzed consistent with methods appropriate for the facility, the media being analyzed, the dangerous constituents being analyzed for, and the anticipated use of the data. Ecology may require or approve modification to the standard analytical methods identified below to provide lower quantitation limits, improved accuracy, and/or greater precision. All analytical procedures should be conducted in accordance with an Ecology approved sampling and analysis plan, as discussed in Section 6 of this guidance.

The methods used for sample collection, sample preservation, transportation, allowable time before analysis, sample preparation, analysis, method detection limits, practical quantitation limits, quality control, quality assurance, and other technical requirements and specifications must comply with the requirements of the following standard methods as applicable:

- ▶ *Test Methods for Evaluating Solid Waste, Physical Chemical Methods*, Third Edition, US EPA, SW-846 and any revisions or amendments thereto;
- ▶ *Methods for Chemical Analysis of Water and Wastes*, U.S. EPA, EPA-600/4-79-020 and any revisions or amendments thereto;
- ▶ *Standard Methods for the Examination of Water and Wastewater*, ASTM American Public Health Association, American Water Works Association and Water Pollution Control Federation and any revisions or amendments thereto.

SW-846 methods should be used to determine contaminant concentrations in soil and solid waste. Any of the referenced methods may be used to determine contaminant concentrations in groundwater. Analyses for which methods have not been specified in this section should be performed using standard methods or procedures such as those specified by the ASTM when available.

## **6.9 Multiple Analytical Methods**

When more than one of the approved methods specified in subsection 6.8 of this guidance has a practical quantitation limit less than the cleanup standard, any of the methods may be selected. When selecting a particular method, facility owner/operators should consider confidence in the data, analytical costs, quality assurance, and analytical efficiencies.

Ecology may require an analysis be conducted by more than one method if there is a reasonable concern about the quality of the data generated by a particular method.

## **6.10 Quality Assurance and Quality Control Requirements**

During closure activities, samples must be collected and analyzed with sufficient quality assurance and quality control (QA/QC) procedures to ensure representative and reliable results. The validity of both sampling techniques and laboratory analytical procedures must be assured so that the data from sampling activities can be used to accurately assess the presence or absence of contamination at the closing unit. For more information on QA/QC requirements, please refer to Ecology's *Guidelines and Specifications for Preparing Quality Assurance Plans* issued in 1991, document number 91-16. Additional information on field documentation and chain-of-custody can be found in U.S. EPA (1986a).

### **6.10.1 Field Quality Assurance/Quality Control**

A field notebook must be maintained by the person conducting closure. The person conducting closure should use the field notebook to record times, dates, and locations of all samples, including QA/QC blanks, as well as daily events, observations, field measurements, and any other applicable information obtained during the field activities. All entries should be made in ink, signed, and dated. Photographs should be taken of each sampling location and of all unusual circumstances encountered during closure activities.

Field QA/QC may also include collection of specific types of samples designed to monitor sampling technique and/or field conditions. Field blanks, equipment blanks, and/or transportation blanks can be used to check for contamination from field conditions, equipment, and/or transportation respectively. Field duplicates can be collected to check the precision of the sample collection and/or the procedures conducted at the laboratory.

Field notebooks and photographs should be kept for a minimum of five years to help reconstruct sampling procedures and to aid, if necessary, in legal testimony.

### **6.10.2 Laboratory Quality Assurance/Quality Control**

All samples taken to document compliance with closure requirements should be submitted to a laboratory accredited under Chapter 173-50 WAC. A listing of accredited laboratories is included as Appendix 1. Updated lists may be obtained by contacting Ecology's Manchester Environmental Laboratory at (206) 871-8800.

Quality assurance/quality control requirements associated with approved analytical methods include analysis of check standards, duplicate samples, spike samples, and method blanks. Check standards are used to estimate the precision of the analytical method. Duplicate analyses of samples are used to check the precision of instrument and the sample preparation. Spikes are used to test for bias due to matrix interference. Method blanks are used to check for laboratory contamination. Such QA/QC should be routinely run because they provide information for interpreting the accuracy, precision, and detection capabilities of the analytical procedures used. As discussed in section 2.1 of this guidance, specific QA/QC methods and activities must be detailed in the closure plan.



Facility owner/operators conducting clean closure must obtain the QA/QC results run with each batch of analyses from the laboratory and must save the QA/QC results with other closure documentation for a minimum of five years.

### **6.11 Data Quality Objectives**

Facility owner/operators should consider data quality objectives before conducting any sampling activity. Data quality objectives are statements of the precision, bias, representativeness, completeness, and comparability of the data necessary for the data to serve the objectives of the project. Guidance on data quality objectives can be found in Ecology's *Guidelines and Specifications for Preparing Quality Assurance Project Plans*, 1991, document number 91-16.

### **6.12 Practical Quantitation Limits**

Laboratories must achieve the lowest practical quantitation limits (PQL) consistent with the selected analytical method; however, Ecology recognizes that there may be situations where a dangerous waste constituent is not detected or is detected at a concentration below the PQL of the chosen analytical method. In situations where the clean closure level is less than the PQL, Ecology may require one or more of the following:

- (1) Use of surrogate measures of contamination;
- (2) Use or development of specialized sample collection or analysis techniques to improve the method detection limit or PQL; and/or
- (3) Additional sampling to assure that the concentrations of dangerous constituents does not exceed detectable levels.

If, after alternatives have been exhausted, the PQL is still higher than the clean closure level for the constituent, Ecology may, based on site-specific considerations and depending on the PQL, consider the PQL to be the clean closure level. If Ecology uses a PQL as a clean closure level, the clean closed unit may be referred to the Toxics Cleanup Program for the periodic review discussed in WAC 173-340-707(2).



## **7.0 CLOSURE TIME LINE**

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The dangerous waste regulations prescribe specific regulatory time frames for the closure process. These regulatory time frames were promulgated at the federal level to ensure that closures begin and are completed in a timely manner. Ecology recognizes that many facilities may be unable to meet the specific time frames articulated in the closure regulations; however, we believe that using time lines and time limits to drive the closure process is vital to timely completion of closure activities. Facility owner/operators who have reason to believe, when developing their closure plans, that the closure time frames articulated in the regulations are inappropriate for their unit and/or facility are encouraged to propose alternative time frames for Ecology review and approval in accordance with the provisions discussed below.

### **7.1 Closure Notification**

Facility owner/operators are required to notify Ecology prior to beginning closure activities. Closure notification is required so Ecology can ensure that the facility has an approved closure plan and that closure proceeds in accordance with applicable regulations. For facility owner/operators without approved closure plans, the closure notification triggers Ecology review and approval of the closure plan in accordance with the procedures discussed in section 2.2 of this guidance.

Facility owner/operators with approved closure plans (this will include most final status facilities, since the closure plan would have been reviewed and approved as part of final permit issuance) must notify Ecology at least sixty (60) days prior to the date on which they plan to begin closure activities at a surface impoundment, waste pile, land treatment, or landfill unit and at least forty-five (45) days prior to the date on which they plan to begin closure activities at a facility with only treatment or storage tanks, container storage, incinerator and/or boiler and industrial furnace units.

Facility owner/operators whose closure plans have not yet been reviewed and approved by Ecology (this will include most facilities operating under interim status) must notify Ecology and submit a copy of their closure plan at least one-hundred and eighty (180) days prior to the date by which they expect to begin closure at a surface impoundment, waste pile, land treatment, or landfill unit and forty five (45) days prior to that date they expect to begin closure at a facility with only treatment or storage tanks, container storage, incinerator and/or boiler and industrial furnace units.

The date which a facility owner/operator expects to begin closure must be either:

- (1) Within thirty (30) days of the date on which any dangerous waste management unit receives the known final volume of dangerous waste or, if there is a reasonable possibility that the dangerous waste management unit will receive additional dangerous wastes, no later than one year after the date on which the unit received the most recent volume of dangerous waste; or

- (2) For landfills, land treatment units, or surface impoundments which have been given approval to receive non-dangerous waste in accordance with WAC 173-303-610(4)(d) and (e) or 40 CFR §265.113(d) and (e) as referenced by WAC 173-303-400(3), thirty (30) days from the date on which the unit received the known final volume of non-dangerous waste or, if there is a reasonable possibility that the unit will receive additional non-dangerous waste, no later than one year after the date on which the unit received the most recent volume of non-dangerous waste.

Ecology may require a facility owner/operator to initiate closure activities. If Ecology requires an interim status facility owner/operator to begin closure activities, the owner/operator must submit a closure plan to Ecology for review and approval no later than fifteen (15) days after termination of interim status or issuance of a judicial decree or final order to cease receiving dangerous wastes and close, see 40 CFR § 265.113(d)(3) as referenced by WAC 173-303-400(3). At permitted facilities, Ecology will impose requirements to initiate closure activities in accordance with the provisions for permit modification or revocation or reissuance at WAC 173-303-830(3) or the provisions for permit termination at WAC 173-303-806(12).

## **7.2 Time Allowed for Closure**

Facility owner/operators are allowed ninety (90) days from the date a closing dangerous waste management unit received the final volume of waste or ninety (90) days from the date Ecology approves the facility/unit closure plan (whichever is later) to remove all dangerous wastes from the closing unit in accordance with the Ecology approved closure plan. Facility owner/operators are allowed an additional ninety (90) days (for a total of 180 days) to complete closure activities in accordance with the approved closure plan. The time allowed for closure is referred to as the “closure period.”

## **7.3 Additional Time Allowed for Closure**

Ecology may approve additional time for closure in two circumstances:

- (1) Closure activities will, of necessity, require additional time to complete (referred to as “extension of closure”); or
- (2) The closing unit has capacity to receive additional dangerous waste or the closing unit is a landfill, land treatment, or surface impoundment unit which has capacity to receive additional non-dangerous waste and complies with WAC 173-303-610(4)(d) and (e) or 40 CFR § 265.113(d) and (e) as referenced by WAC 173-303-400 (referred to as “delay of closure”).

Many facility owner/operators may foresee, when preparing closure plans, that closure activities will, of necessity, take longer than 180 days to complete or that the closing unit will receive additional dangerous or non-dangerous waste. If this is the case, facility owner/operators may submit appropriate documentation and request additional time for closure period in the closure plan. Provided the documentation is sufficient, Ecology may approve additional time for closure when approving the closure plan.

At a minimum, all requests for extensions or delays to the closure period should be made in accordance with the procedures discussed below and should be submitted at least thirty (30) days before the deadline for which the extension or delay is requested.

### **7.3.1 Extension of Closure**

In order for Ecology to approve an extension to the closure period, the facility owner/operator must demonstrate that closure activities will, of necessity, take additional time to complete. Ecology will determine, on a case-by-case basis, circumstances which constitute a “necessity” for extension; however, Ecology would likely consider extensions associated with required analytical work, scheduling of equipment and personnel, or inclement weather conditions (e.g., frozen ground could prevent sampling) as necessary. In addition to demonstrating that the extension is necessary, the facility owner/operator must show that he/she has taken and will continue to take all steps to prevent threats to human health and the environment. At permitted facilities, the demonstration must also include documentation of compliance with all applicable permit conditions and the facility owner/operator must comply with all applicable requirements for modification of the permit. Final status facility owner/operators should refer to WAC 173-303-610(4)(a)(i) for an extension to the closure period for additional time to remove waste and/or WAC 173-303-610(4)(b)(i) for extension of the closure period for additional time to complete remaining closure activities. Owner/operators of facilities operating under interim status, should refer to 40 CFR § 265.113(a)(1)(i) and (b)(1)(i) as referenced by WAC 173-303-400(3).

### **7.3.2 Delay of Closure**

In order for Ecology to approve a delay of closure, the facility owner/operator must demonstrate that the closing unit has capacity to receive additional dangerous or non-dangerous wastes,<sup>4</sup> that there is reasonable likelihood operation of the unit will recommence within one year, and closure of the unit would be incompatible with continued operation of the facility. Ecology will review and approve requests for delays of closure on a case-by-case basis. As an example, Ecology would likely approve a delay of closure if a facility owner/operator could demonstrate that the unit subject to closure was not in operation because the waste stream managed at the closing unit is generated by a process shut down for extended maintenance, the extended maintenance will take less than one year, and the process, when restarted, will generate the same dangerous waste stream. The facility owner/operator must also demonstrate that he/she has taken and will continue to take all steps to prevent threats to human health and the environment. At permitted facilities, the demonstration must include documentation of compliance with all applicable permit conditions and the facility owner/operator must comply with all applicable requirements for modification of the permit. Final status facility owner/operators should refer to WAC 173-303-610(4)(a)(ii) and WAC 173-303-610(4)(b)(ii). Owner/operators of facilities operating under interim status should refer to 40 CFR § 265.113(a)(1)(ii) and (b)(1)(ii) as referenced by WAC 173-303-400(3).

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<sup>4</sup> Delay of closure for units to receive additional non-hazardous waste is only available for landfills, land treatment units, and surface impoundments.

For Ecology to approve a delay of closure for a landfill, land treatment unit, or surface impoundment to receive additional non-dangerous waste, the final status facility owner/operator must also comply with WAC 173-303-610(4)(d) and (e). The owner/operators of a facility operating under interim status must also comply with 40 CFR § 265.113(d) and (e) as referenced by WAC 173-303-400(3). Delays of closure to allow a landfill, land treatment unit, or surface impoundment to receive additional non-hazardous waste are considered class two dangerous waste permit modifications and must conform with the associated requirements for review and approval, including public notice and a 60-day public comment period.

## 7.4 Closure Certification

Within sixty (60) days of completion of closure activities at each dangerous waste management unit and within sixty (60) days of completion of final facility closure, the facility owner/operator must submit a closure certification to Ecology. The closure certification must be sent to Ecology by registered mail and must certify that the dangerous waste management unit or facility was closed in accordance with the requirements and specifications of the approved closure plan. The closure certification must be signed by the facility owner/operator and signed and stamped by an “independent qualified registered professional engineer.”<sup>5</sup> Documentation supporting the closure certification must be provided to Ecology on request. At a minimum, Ecology will typically require the following documentation and information to support a clean closure certification:

- (1) All field notes related to closure activities;
- (2) A description of any minor deviations from the approved closure plan and justification for these deviations,<sup>6</sup>
- (3) Documentation of the final disposition of all dangerous wastes and dangerous waste residues, including contaminated media, debris, and all treatment residuals;
- (4) All laboratory and/or field data, including quality assurance/quality control data, for all samples and measurements, including samples and measurements taken to determine background conditions and/or to determine or confirm clean closure; and
- (5) A summary report which itemizes the data reviewed by the independent, qualified, registered, professional engineer and tabulates the analytical results of samples taken to determine and/or confirm clean closure.

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<sup>5</sup> Ecology defines “independent qualified registered professional engineer” as, “a person who is licensed by the state of Washington, or a state which has reciprocity with the state of Washington as defined in RCW 18.43.100, and who is not an employee of the owner or operator of the facility for which construction or modification certification is required. A qualified professional engineer is an engineer with expertise in the specific area for which certification is given.” See WAC 173-303-040.

<sup>6</sup> Most deviations from an approved closure plan are subject to prior Ecology review and approval in accordance with the provisions for amending closure plans, see section 3.3 of this guidance.

## **7.5 Closure Verification**

Ecology will verify closure certifications by reviewing the information submitted to support the certification, the facility closure plan, any documentation or information generated by Ecology during oversight of closure activities (e.g., inspection reports), and other pertinent information and documentation. If Ecology accepts the closure certification, Ecology will inform the facility owner/operator of the acceptance in writing.

In some cases, Ecology may be unable to verify the certification of closure and, therefore, unable to accept the closure certification. Typically, these cases will involve units/facilities at which groundwater contamination was discovered during closure activities or units/facilities whose owner/operators did not keep the records and other documentation necessary for Ecology to verify a closure certification. In such cases, Ecology may require additional groundwater or other sampling and monitoring to verify the closure certification or may require the facility owner/ operator to submit an application for a post-closure permit. If sampling and/or monitoring is required, Ecology will extend the closure period to cover the time period of the required monitoring, and the closure certification will not be accepted until the facility owner/operator has completed the required activities.





## 8.0 REFERENCES

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